DFI100HF12DE1

1200V/100A Half Bridge IGBT Module

Description

The DFI100HF12DE1 offer ultrafast switching speed for high frequency application.

Features

- 1200V100 A, VCE (sat)(typ.) = 3.0V
- Ultrafast switching speed
- Excellent short circuit ruggedness
- 34mm half bridge module

Applications

- Welder
- Inverter
- Power supply
- Inductive heating
- UPS EPS

Circuit diagram

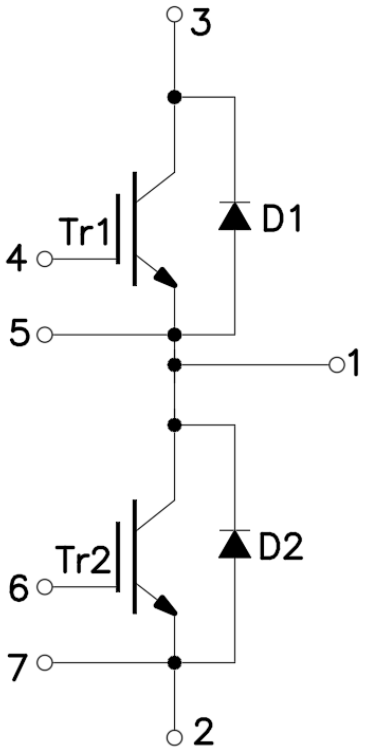

Figure 1. Out drawing & circuit diagram for DFI100HF12DE1

Pin Configuration and Marking Information

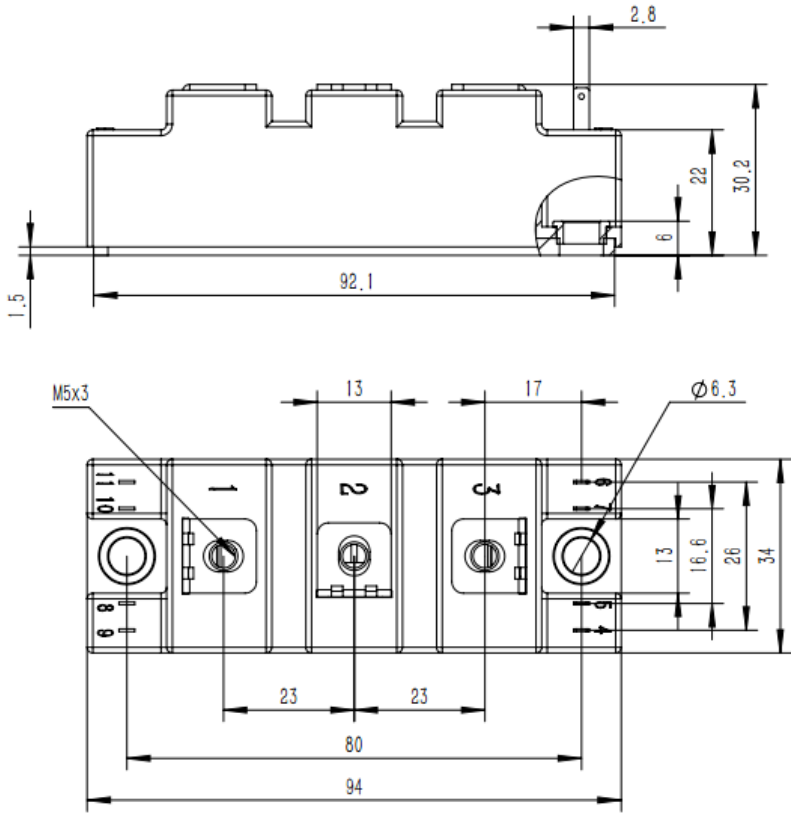

Figure 2. Pin configuration

Module

Parameter	Conditions	Value	Unit
Isolation Voltage	RMS, f = 50Hz, t =1min	2.5	KV
Material of module baseplate	-	Cu	-
Creepage distance	terminal to heatsink terminal to terminal	14.5 13	mm
Clearance	terminal to heatsink terminal to terminal	12.5 10	mm
CTI	-	>200	-
Module lead resistance, terminals – chip	T_C =25°C	0.8	mΩ
Mounting torque for module mounting	M5, M6	3 to 6	Nm
Weight	-	160	g

Maximum Ratings (IGBT,T_j =25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{CES}	Collector-Emitter Voltage	G-E Short	1200	V
V_{GES}	Gate-Emitter Voltage	C-E Short	±30V	V
I_C	DC Continuous Collector Current	T_C =100°C	100	A
I_{CM}	Pulse Collector Current	t_p =1ms, Note1	200	A
P_C	Maximum Power Dissipation	T_C =25°C, T_j =150°C(IGBT)	430	W
T_j	junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

Maximum Ratings (Freewheeling diode, T_j =25°C unless otherwise specified)

Symbol	Parameter	Conditions	Ratings	Unit
V_{RRM}	Peak Repetitive Revers Voltage	-	1200	V
I_F	Diode forward Current	Tc =100°C	100	A
I_{FRM}	Repetitive peak forward Current	t_p =1ms, Note1	200	A
T_j	junction temperature	-	-40 to 150	°C
T_{stg}	Storage temperature	-	-40 to 125	°C

Note1: Pulse width limited by maximum junction temperature

IGBT Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
$V_{CE(sat)}$ (Chip)	Collector-Emitter Saturation Voltage	I_C =100A, V_{GE} =15V	T_j =25°C	-	3.00	3.20	V
			T_j =125°C	-	3.60	-	V
$V_{GE(th)}$	Gate-Emitter threshold Voltage	I_C =1mA, V_{CE} =V_{GE}		4.5	-	5.7	V
Q_G	Gate charge	V_{GE} = -15V to +15V		-	0.87	-	uC
R_{Gint}	Internal gate resistor	f=1M,Vpp=1V	T_j =25°C	-	1.9	-	Ω
C_{ies}	Input Capacitance	V_{CE} =25V, V_{GE} =0V, f =1MHz	T_j =25°C	-	8.00	-	nF
C_{oes}	Output Capacitance			-	1.35	-	nF
C_{res}	Reverse transfer Capacitance			-	0.81	-	nF
I_{CES}	Collector- Emitter Cut off Current	V_{CE} =1200V, V_{GE} =0V	T_j =25°C	-	-	1	mA
I_{GES}	Gate-Emitter Leakage Current	V_{GE} = 30V, V_{CE} =0V	T_j =25°C	-	-	200	nA
$t_{d(on)}$	Turn-on delay time		T_j =25°C	-	30	-	ns
			T_j =125°C	-	35	-	
t_r	Rise time		T_j =25°C	-	50	-	ns
			T_j =125°C	-	55	-	
$t_{d(off)}$	Turn-off delay time		T_j =25°C	-	380	-	ns
			T_j =125°C	-	390	-	

t_f	Fall time	V_{CC} =600V I_C = 100A V_{GE} =+15V/-15V R_G =5.6Ω Inductive load	T_j =25°C	-	110	-	ns
			T_j=125°C	-	160	-	
E_{on}	Turn-on power dissipation		T_j =25°C	-	4.6	-	mJ
			T_j =125°C	-	5.7	-	
E_{off}	Turn-off power dissipation		T_j =25°C	-	3.1	-	mJ
			T_j =125°C	-	5.1	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (IGBT)			-		0.29	°C/W

Freewheeling Diode Electrical characteristics (T_j =25°C unless otherwise specified, chip)

Symbol	Item	Condition		Value			Unit
				Min.	Typ.	Max	
V_F	Diode Forward Voltage	I_F =100A, V_{GE} =0V	T_j =25°C	-	1. 9	2. 2	V
			T_j =125°C	-	1. 9	-	
t_{rr}	Reverse recovery time	V_{rr} =600V, I_F =100A di/dt=1600A/μs	T_j =25°C	-	115	-	ns
			T_j =125°C	-	250	-	
I_{rr}	Peak reverse recovery Current		T_j =25°C	-	120	-	A
			T_j =125°C	-	135	-	
Q_{rr}	Recovered charge		T_j=25°C	-	10.0	-	nC
			T_j =125°C	-	15.0	-	
E_{rr}	Reverse recovered energy		T_j =25°C	-	3.7	-	mJ
			T_j =125°C	-	6.2	-	
$R_{th(j-c)}$	Thermal Resistance, Junction to Case (Diode)			-		0.46	°C/W

Test Conditions

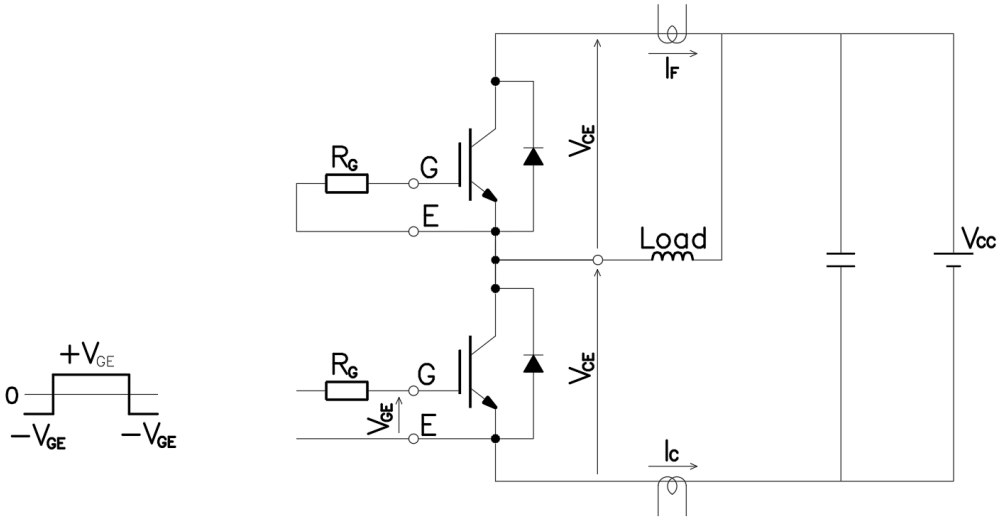

Figure 3. Switching time measure circuit

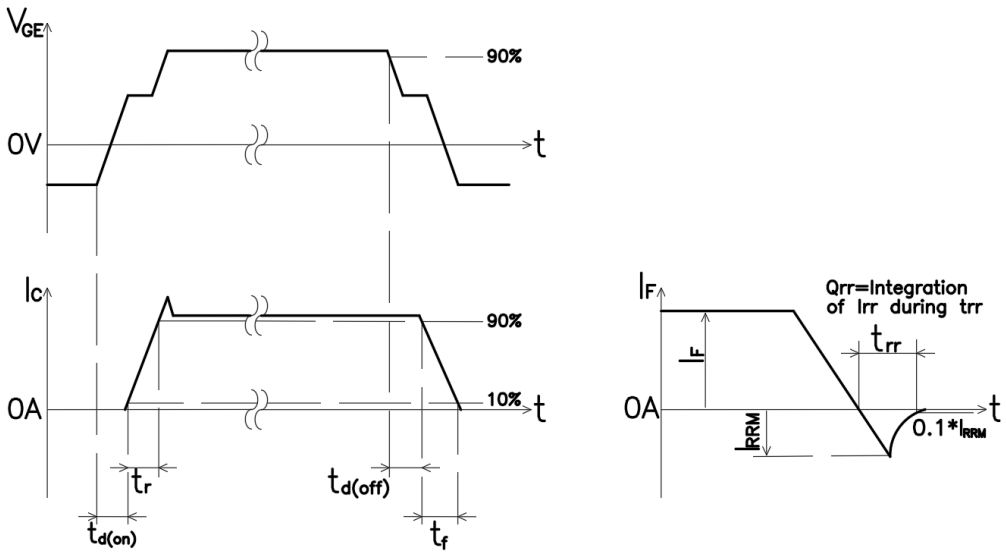

Figure 4. Switching time definition

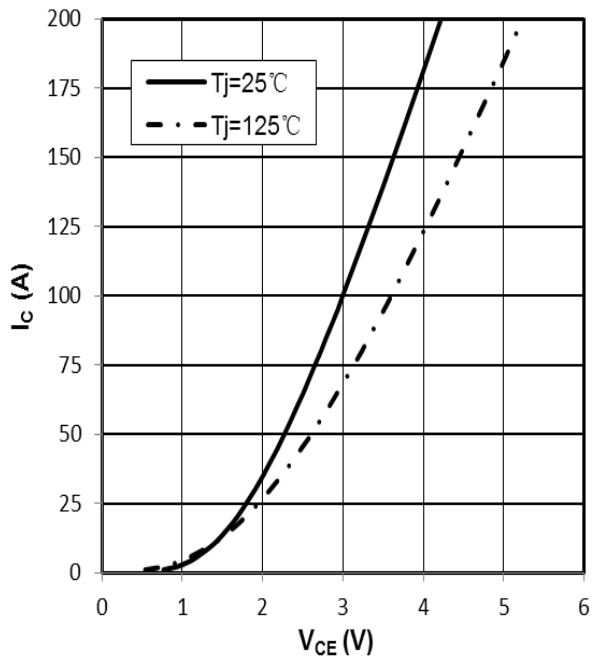

Figure 5. Ic vs V_{CE}
V_{GE} =15V

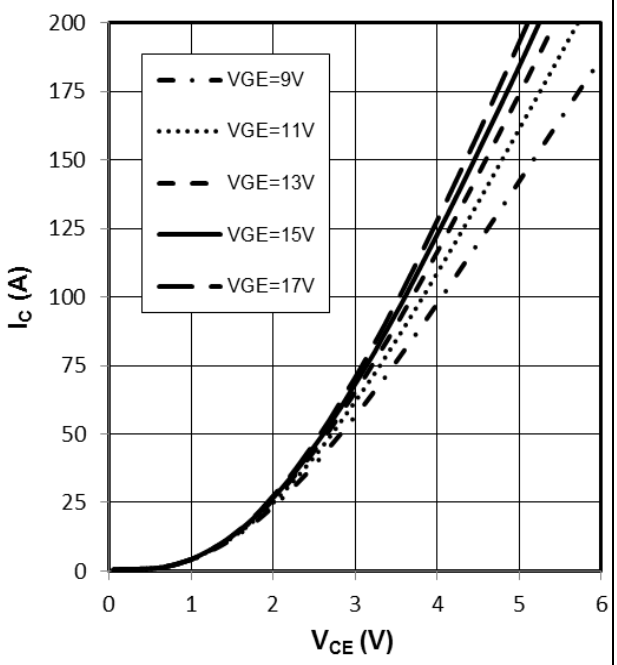

Figure 6. Ic vs V_{CE}
T_j =125°C

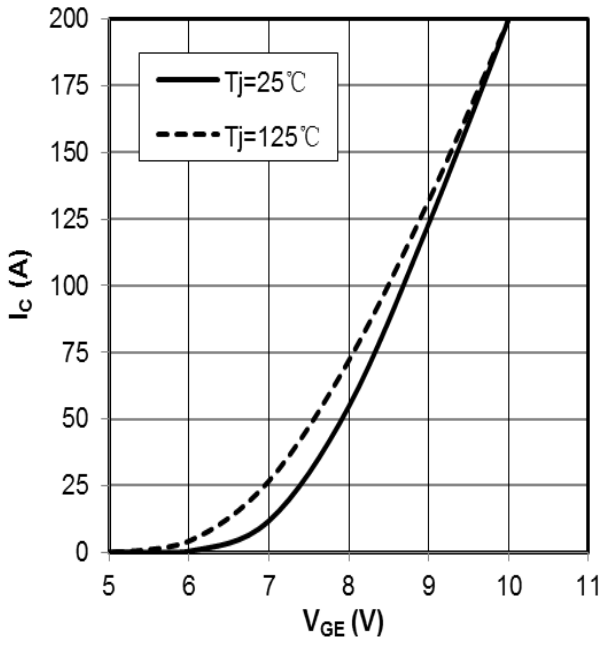

Figure 7. Ic vs V_{GE}
V_{CE} =20V

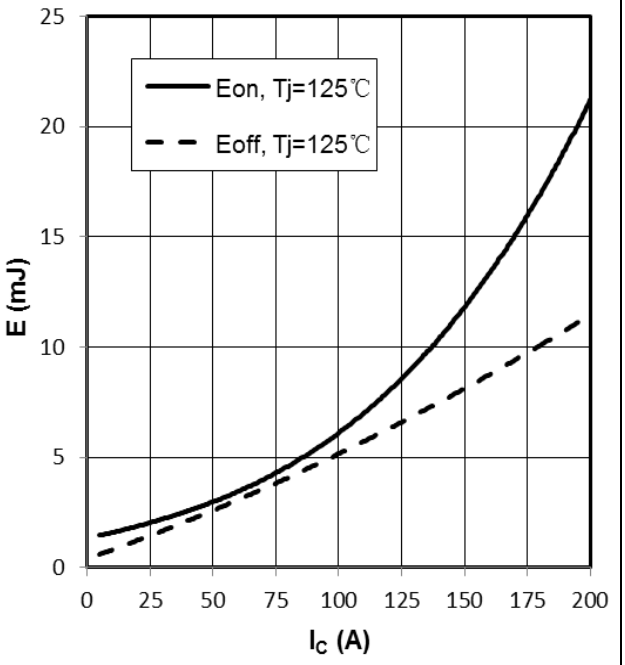

Figure8. E_{on}, E_{off} vs Ic(Typ)
V_{CC}=600V, V_{GE} =+15V/-15V, R_G =5.6Ω

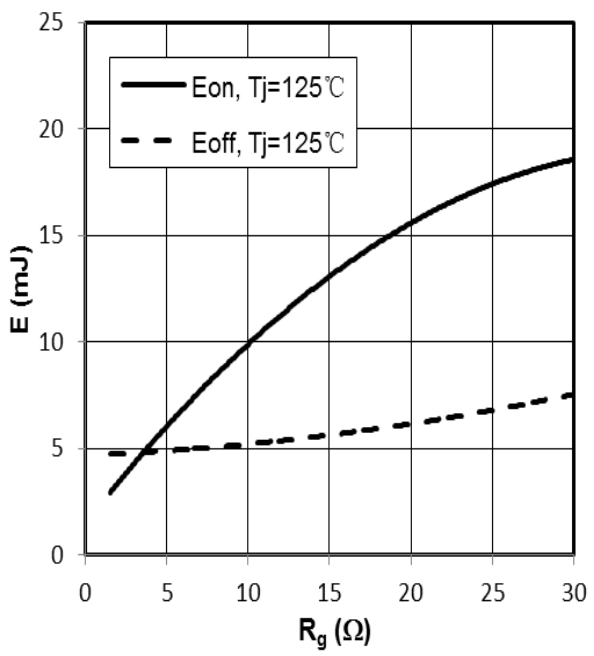

Figure 9. E_{on}, E_{off} vs R_g(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, I_C =100A

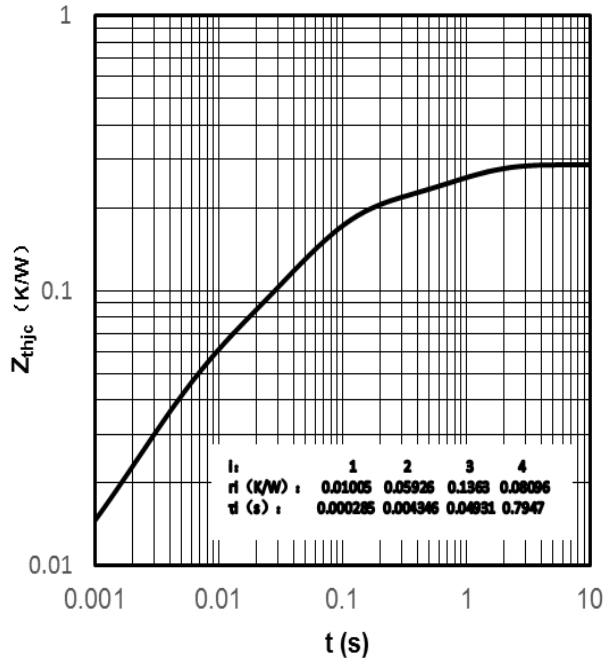

Figure 10. Transient thermal impedance IGBT , Zthjc=f(t)

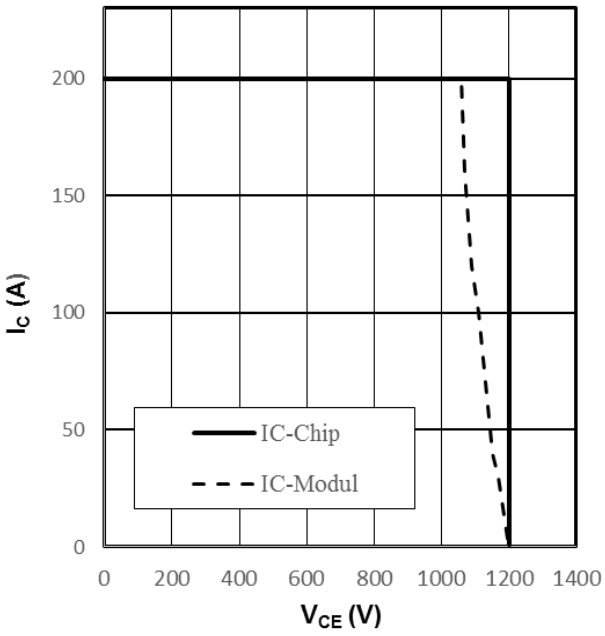

Figure 11. Reverse bias safe operating area IGBT, I_C=f(V_{CE}),V_{GE}=±15V,R_{Goff}=5.6Ω， Tvj=125℃

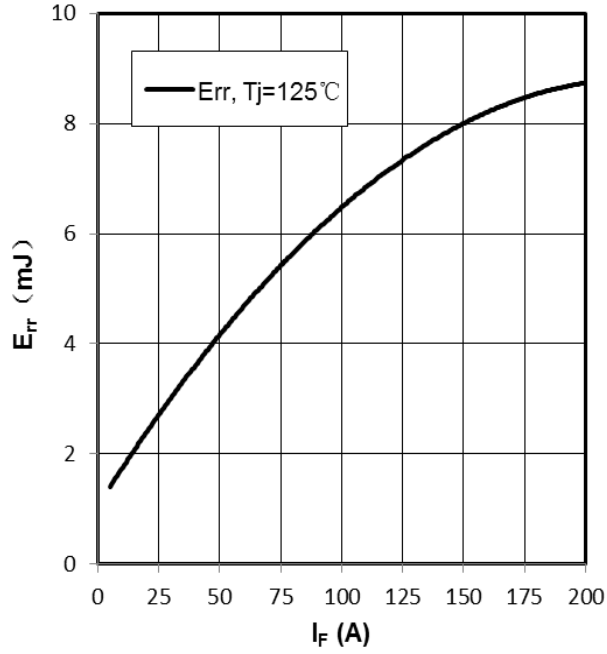

Figure 12. E_{rr} vs I_F(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, R_G =5.6Ω

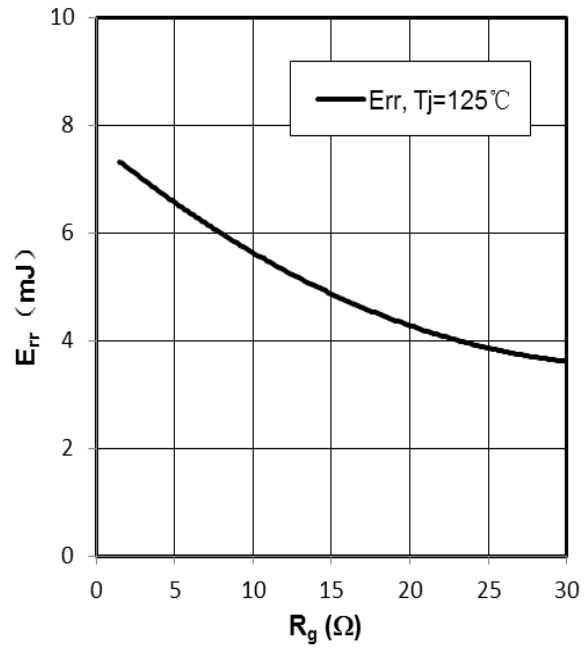

Figure 13. Err vs R_G(Typ)
V_{CC} =600V, V_{GE} =+15V/-15V, I_F =100A

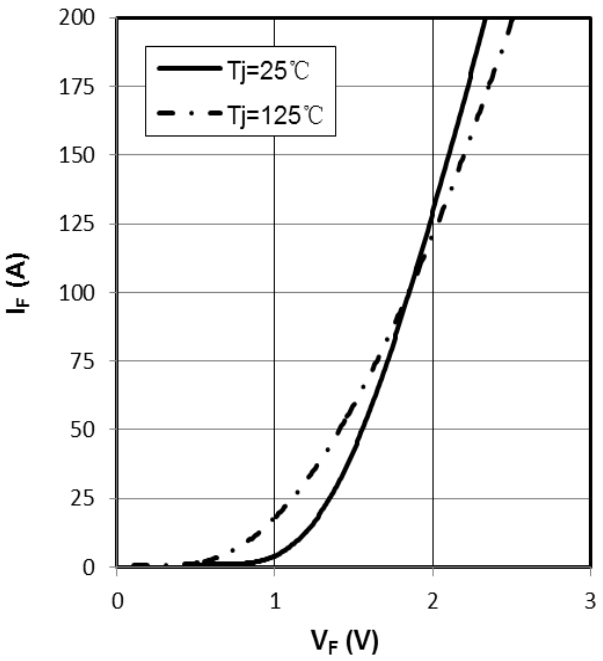

Figure 14. forward characteristic of Diode ，
$I_F=f(V_F)$